A Brief Summary of Logic and Reasoning

Logic is the **study** of the principles or rules for **valid** & **consistent** reasoning. (Webster's Dictionary)
Reasoning is the **capacity** for rational thought, inference, or discrimination. (Webster's Dictionary)

Types of Reasoning:

Inductive Reasoning: (Specific to General) Many examples leading to a general conclusion.
Example: M**any** examples **leading** (convincing**)** to a general conclusion.

Deductive Reasoning: (General to Specific) General statement leading to a specific conclusions.
Example: A sequence of steps **leading** (convincing) to a specific conclusion

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Types of Deductive Statements: **(<> means not equal)**

If (Given Information) **then** (Statement to be Proved)
Hypothesis **Conclusion**

Conditional	**If** A = B	**Then** A + C = B + C
Converse	**If** A +C = B + C	**Then** A = B
Inverse	**If** A <> B	**Then** A+C <> B + C
Contrapositive:	**If** A + C <> B + C	**Then** A <> B

Rectangle of Reason implies that ***proving*** *two diagonal statements* ***proves*** *all four statements.*

Converse	**Conditional**
Contrapositive	**Inverse**

Types of Logical Situations:

Dichotomy Situation: (Only **Two** Possibilities)
Equal **or** Not Equal True **or** False
Guilty **or** Innocent Male **or** Female

Trichotomy Situation: (Only **Three** Possibilities)
Greater Than Equal Less Than
Always Sometimes Never
True Maybe False
Guilty Innocent No Contest

Types of Proofs: (**Definition of Proof**: Evidence or agrument **establishing** the truth of a statement.)

Direct Proof: **Proves the Original Statement to be True.**
Proof by Testimonial **Proof** by Analogy
Proof by Induction **Proof** by Deduction
(**TV Commercials** use **which type of proofs** to convince you to buy their product.)

Indirect Proof: **Proves the Alternate Statement to be False.**
To use an Indirect Proof, one has to establish a Dichotomy or Trichotomy. (☺)
(**Many trial lawyers** try to convince jury **Guilty is not possible** thus **Innocent is true**.)
Many trial lawyers try to prove using **Induction** since many cases proves one case!

Reference: ***The Teaching of Mathematics from Counting to Calculus*****, Harold P. Fawcett and Kenneth B. Cummins**

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